

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 17 May 2001 (17.05.01)	
International application No. PCT/NL00/00632	Applicant's or agent's file reference G PEM/DL/2
International filing date (day/month/year) 08 September 2000 (08.09.00)	Priority date (day/month/year) 08 September 1999 (08.09.99)
Applicant WILLEMSSEN, Louis, Rinze, Henricus, Adrianus	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

09 April 2001 (09.04.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Olivia TEFY Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference G/XR01/MH/2	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/NL00/00632	International filing date (day/month/year) 08/09/2000	Priority date (day/month/year) 08/09/1999	
International Patent Classification (IPC) or national classification and IPC B29C51/34			
Applicant WEASY PACK INTERNATIONAL LTD. et al.			


1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 09/04/2001	Date of completion of this report 12.11.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer De Waard, W Telephone No. +49 89 2399 2918



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference G/XR01/MH/2	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
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- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 09/04/2001	Date of completion of this report 12.11.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer De Waard, W Telephone No. +49 89 2399 2918 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00632

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-6 as originally filed

Claims, No.:

1-7 as received on 25/10/2001 with letter of 24/10/2001

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00632

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-7
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 1-7
Industrial applicability (IA)	Yes: Claims 1-7
	No: Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The nearest prior art is shown in GB-A-1205694 (D1).

Actually, the features specified in the preamble of claim 1 are known from D1.

US-A-3,259,942 (D3) discloses a device for forming a number of thin-walled contains comprising a mould with segments which are linearly movable between a first and a second position, each of the segments being drivable and coupled to a common hydraulic drive element (compare D3, figures 4, 5 and col.5, lines 26-30).

Thus, the characterizing features of claim 1 have already been employed for the same purpose in a similar apparatus. It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to an apparatus according to document D1, thereby arriving at an apparatus according to claim 1.

The subject-matter of claim 1 does therefore not involve an inventive step (Article 33(3) PCT).

2. The features additionally specified in dependent claims 2-7 are merely straight-forward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

Re Item VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 is not mentioned in the description, nor are these documents identified therein.
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Re Item VIII

Certain observations on the international application

1. In claim 1 means for carrying the layer of material to be moulded, supply means for supplying gas to the lower mould, heating means for heating the mould and mandrels movable into the cavities are specified.

However, the above features are neither disclosed in the description nor in the drawings.

Therefore, claim 1 is not considered to be fully supported by the description (Article 6 PCT).

2. The expression "blow-moulding" is considered to be misleading in the context of the description. More appropriate appears to be "thermoforming".

G/XR01/MvZ/2

PCT/NL00/00632

EPO - DG 1

25. 10. 2001

NEW CLAIMS

(59)

1. Device for forming a number of thin-walled objects by means of a blow-moulding process from a layer of material which is deformable when heated, comprising:

- a lower mould with cavities arranged therein,
5 wherein the shape of each of the cavities corresponds with the external shape of the objects to be formed;
- means for carrying the layer of material to be moulded onto the lower mould;
- supply means for supplying gas to the upper
10 side of the lower mould;
- heating means for heating the lower mould;
- and
- mandrels movable into the cavities;
- wherein the lower mould is divided into at
15 least three segments placed around each cavity, wherein the separating planes between the segments extend substantially perpendicularly of the upper surface of the lower mould;
- wherein the segments are movable in
20 substantially radial direction between a first position, in which they form the wall of the cavity enclosed by the segments, and a second position in which an object formed in the cavity can be moved out of the mould, and
- wherein each of the segments is drivable for
25 movement between the first and second position by a drive member

characterized in that

- the movement between the first position and the second position is a linear movement; and
30 that each of the segments is coupled to a common drive element.

2. Device as claimed in claim 1, characterized in that the common drive element is adapted to execute a movement in a direction perpendicular to the direction of

movement of the segments, and that the common drive element is connected to the four segments by means of a coupling converting the direction of movement.

3. Device as claimed in claim 2, characterized
5 in that the coupling comprises four prismatic pins, each extending at the same angle relative to the direction of movement of the drive element, and that the segments each comprise a channel into which the pins fit and the axis of which corresponds with the axis of the pins.

10 4. Device as claimed in claim 3, characterized in that the linear drive elements extend in the vertical direction.

5. Device as claimed in any of the foregoing claims, characterized in that at least one plate forming
15 part of the lower mould is arranged connecting onto the segments and that the plate is provided with guide means for guiding the segments when they execute their movement between the first position and the second position.

6. Device as claimed in claim 4, characterized
20 in that in each of the cavities is arranged a stamp which is movable in vertical direction to eject the formed objects.

7. Device as claimed in claim 6, characterized
in that the stamps are coupled for driving to the drive
25 for the segments.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

RECORD COPY

CONFIRMATION

For receiving Office use only

PCT/NL

00 / 00632

International Application No.

08 SEP. 2000

(08.09.00)

International Filing Date

BUREAU VOOR DE INDUSTRIËLE EIGENDOM
PCT. INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference

(if desired) (12 characters maximum)

G PEM/DL/2

Box No. I TITLE OF INVENTION

RELEASING MOULD FOR A BLOWING PROCESS

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

WEASY PACK INTERNATIONAL Ltd.
Brumby House 1st Floor
Jalan Bahasa
F.T. LABUAN
Malaysia

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

Malaysia (MY)

State (that is, country) of residence:

Malaysia (MY)

This person is applicant for the purposes of:

☐ all designated States☒ all designated States except the United States of America☐ the United States of America only☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

WILLEMSSEN, Louis Rinze Henricus Adrianus
Rijksweg 37
NL-4849 BM DORST
The Netherlands

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

The Netherlands (NL)

State (that is, country) of residence:

The Netherlands (NL)

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

EVELEENS MAARSE, Pieter
ARNOLD & SIEDSMA
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☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-box; at least one must be marked):

- Regional Patent**
- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LC Saint Lucia |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda | <input checked="" type="checkbox"/> LK Sri Lanka |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BZ Belize | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> MZ Mozambique |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DZ Algeria | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZA South Africa |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |

Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:



Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

See Notes to the request form

Box No. VI PRIORITY CLAIM		Where earlier application is:		
Filing date of earlier application (day/month/year)	Number of earlier application	national application: country	regional application: regional Office	international application: receiving Office
item (1) 8 September 1999 (08-09-1999)	NL 1013002	The Netherlands		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): 1

* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA)
(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year) Number Country (or regional Office)

ISA /

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 3
description (excluding sequence listing part) : 7
claims : 3
abstract : 1
drawings :
sequence listing part of description :
Total number of sheets : 14

This international application is accompanied by the item(s) marked below:

- ☒ fee calculation sheet
- ☐ separate signed power of attorney
- ☐ copy of general power of attorney; reference number, if any:
- ☐ statement explaining lack of signature
- ☒ priority document(s) identified in Box No. VI as item(s): 1
- ☐ translation of international application into (language):
- ☐ separate indications concerning deposited microorganism or other biological material
- ☐ nucleotide and/or amino acid sequence listing in computer readable form
- ☐ other (specify):

Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application: Dutch

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



EVELEENS MAARSE, Pieter

For receiving Office use only		2. Drawings:
1. Date of actual receipt of the purported international application:	<u>08 SEP. 2000</u> (<u>08.09.00</u>)	<input checked="" type="checkbox"/> received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		<input type="checkbox"/> not received:
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): <u>ISA /</u>	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

Date of receipt of the record copy by the International Bureau:

12 OCTOBER 2000

(12.10.00)

G PEM/DL/Weasy2

LOSSENDE VORM VOOR EEN BLAASPROCES

De uitvinding heeft betrekking op een inrichting voor het door middel van een blaasproces van een laag materiaal dat bij verwarming vervormbaar is vormen van een aantal dunwandige voorwerpen, omvattende:

5 - een ondermatrijs met daarin aangebrachte holten, waarbij de vorm van elk van de holten overeenkomt met de buitenvorm van de te vormen voorwerpen;

 - middelen voor het tot op de ondermatrijs brengen van de te vormen laag materiaal;

10 - toevoermiddelen voor het toevoeren van gas aan de bovenzijde van de ondermatrijs;

 - verwarmingsmiddelen voor het verwarmen van de ondermatrijs; en

 - tot in de holten beweegbare doorns.

15 Dergelijke inrichtingen zijn algemeen bekend.

Zij worden toegepast voor het door een blaasproces vormen van producten zoals houders voor koffiemelk, yoghurt, salades en talloze andere producten. Hierbij wordt uitgegaan van een dunne laag materiaal dat bij warmte
20 vervormbaar is, en dat door middelen van perslucht, of samengeperste lucht vast in de holte wordt geduwd, daar wordt afgekoeld, waardoor de vorm behouden blijft, en het voltooide product vervolgens wordt weggevoerd.

Het feit dat het in zekere mate vormvaste
25 product uit de vorm moet worden verwijderd legt bij de stand van de techniek beperkingen op aan de vorm van het product.

Er bestaat echter behoefte aan meer vrijheid bij het kiezen van de vorm van het product om het product
30 bijvoorbeeld extra functies te verschaffen.

Het doel van de onderhavige uitvinding is dan ook het verschaffen van een dergelijke inrichting die geschikt is voor het vervaardigen van vormen die bij de

stand van de techniek niet uit de vorm kunnen worden gelost.

Dit doel wordt bereikt, doordat de ondermatrijs verdeeld is in aantal segmenten, waarbij rondom elke holte een aantal segmenten is geplaatst en de segmenten in hoofdzakelijk radiale richting beweegbaar zijn tussen een eerste positie waarin zij de wand vormen van de holte die door de segmenten wordt omsloten en een tweede positie waarin een in de holte gevormd voorwerp tot buiten de vorm beweegbaar is.

Door de beweegbaarheid van de segmenten tussen een eerste positie, waarin het vormproces plaatsvindt, en een tweede positie, waarin het verstarde product uit de vorm kan worden verwijderd, leidt tot een grotere vrijheid bij het kiezen van de vorm van de te voltooien producten.

Hierbij wordt opgemerkt, dat het bij spuitgietproductie wel bekend is deelbare vormen te gebruiken. Spuitgieten betreft echter een proces waarbij een grotere vrijheid bestaat en een veel grotere ruimte beschikbaar is voor het laten bewegen van segmenten van de vorm. Bij blaasvormen is dit niet het geval; het blaasproces beperkt in hoge mate de beweegbaarheid van de vorm; blaasproducten worden, als gevolg van het proces naast elkaar, dat wil zeggen met hun bovenvlak allen in hetzelfde vlak vervaardigd, waarbij de bewegingen van de vorm welke in het betreffende proces meestal wordt aangeduid als ondermatrijs, onder het desbetreffende vlak beperkt is. Tot nu toe wordt dan ook aangenomen dat het onmogelijk is een inrichting te verschaffen voor het blaasproces waarbij de matrijzen deelbaar zijn voor het lossen van het gereden product.

Zeker bij het vervaardigen van kleine producten zal een blaasvorm een relatief groot aantal holten bevatten zodat het probleem nog wordt versterkt.

Volgens een eerdere uitvoeringsvorm wordt elke holte door tenminste drie segmenten omgeven waarbij de scheidingsvlakken tussen de segmenten zich hoofdzakelijk

loodrecht op het bovenvlak van de ondermatrijs uitstrekken, en is elk van de segmenten door een aandrijforgaan aandrijfbaar voor beweging tussen de eerste en tweede positie.

5 Geometrische overwegingen wijzen op de aantrekkelijkheid van deze uitvoeringsvorm; de afstand tussen de eerste en de tweede positie van de segmenten is beperkt, terwijl toch voldoende vrijheid voor het lossen van de vorm wordt verkregen.

10 Volgens een aantrekkelijke uitvoeringsvorm wordt elke holte door vier segmenten omgeven, waarbij elk van de segmenten door een linea aandrijforgaan aandrijfbaar is. Het gebruik van vier segmenten leidt tot een structuur van zich loodrecht op elkaar uitstreckende
15 trajecten, hetgeen constructief aantrekkelijk is.

 Wanneer de vier segmenten die in de tweede positie zich dichterbij elkaar bevinden dan in de eerste positie, met een gemeenschappelijk aandrijfelement zijn gekoppeld, ontstaat een
20 vereenvoudiging doordat het aantal aandrijfelementen wordt verkleind.

 Volgens een bijzonder aantrekkelijke uitvoeringsvorm is het gemeenschappelijke aandrijfelement ingericht voor het uitvoeren van een beweging in een
25 richting loodrecht op de bewegingsrichting van de segmenten en is het gemeenschappelijke aandrijfelement door middel van een de bewegingsrichting omzettende koppeling met de vier segmenten verbonden.

 Deze configuratie is constructief bijzonder
30 aantrekkelijk; een gemeenschappelijk aandrijfelement kan worden gebruikt voor het veroorzaken van een beweging in vier verschillende richtingen.

 Er ontstaat een nog aantrekkelijker uitvoeringsvorm wanneer de koppeling vier zich elk onder
35 een zelfde hoek met de bewegingsrichting van het aandrijfelement uitstreckende prismatische pennen omvat, en de segmenten elk een kanaal omvatten waarin de pennen

passen en waarvan de as overeenkomt met de as van de pennen.

Mits deze constructie met een voldoende kleine tolerantie is vervaardigd, ontstaat een constructief zeer
5 simpele configuratie.

Andere aantrekkelijke uitvoeringsvormen blijken uit de overige onderconclusies.

Vervolgens zal de onderhavige uitvinding worden toegelicht aan de hand van bijgaande figuren, waarin
10 voorstellen:

Figuur 1: een gedeeltelijk weggebroken perspectivisch aanzicht van een eerste uitvoeringsvorm van een inrichting volgens de onderhavige uitvinding in een eerste positie van de segmenten;

15 Figuur 2: een met Figuur 1 overeenkomen aanzicht waarbij de segmenten zich in de tweede positie bevinden;

Figuur 3: een gedeeltelijk weggebroken perspectivisch aanzicht waarvan een tweede
20 uitvoeringsvorm van een inrichting volgens de onderhavige uitvinding; en

Figuur 4: een met Figuur 3 overeenkomend aanzicht waarbij de segmenten zich in de tweede positie bevinden.

25 In Figuur 1 is een vorm afgebeeld, welke in zijn geheel met 1 is aangeduid. De ondermatrijs wordt gevormd door een basisplaat 2, een tussenplaat 3 en een bovenplaat 4. Tussen de bovenplaat 4 en de tussenplaat 3 is een groot aantal segmenten 5 aangebracht. Hierbij zijn
30 de segmenten 5 gegroepeerd rondom holte 6.

Bij het onderhavige uitvoeringsvoorbeeld zijn rondom elke holte 6 vijf segmenten aangebracht. De holten komen overeen met desbetreffende, in de bovenplaat 4
aangebrachte gaten 7. De tussenplaat 3 en de bovenplaat 4
35 zijn met elkaar verbonden door verbindingselementen 8. De verbindingselementen 8 zijn zodanig geplaatst dat zij de bewegingen van de segmenten 5 niet hinderen.

Voor het aandrijven van de segmenten 5 tussen de in figuur 1 weergegeven eerste positie waarin de vorming van het product kan plaatsvinden en de in figuur 2 weergegeven positie waarin het product uit de vormen 5 gelost kan worden, zijn in de segmenten 5 kanalen 9 aangebracht. In de kanalen strekken zich pennen 10 uit, welke in het onderhavige geval met een rechthoekige doorsnede zijn getekend, doch welke evenzeer rond, bijvoorbeeld met de vorm van een cirkelcilinder kunnen 10 zijn uitgevoerd. Essentieel hiervoor is dat zij precies passen in de kanalen 9.

De pennen 10 zijn allen verbonden met een cilinder 11. Elk van de cilinders 11 is verbonden met onderplaat 2. Door aldus de onderplaat 2 naar boven of 15 naar beneden te bewegen, worden de segmenten bewogen tussen hun eerste, in Figuur 1 weergegeven positie en tweede, in Figuur 2 weergegeven positie.

Het zal duidelijk zijn dat het mogelijk is andere vormen van aandrijving toe te passen, bijvoorbeeld 20 een individueel aandrijfelement in plaats van elk van de cilinders 11. Tevens is het mogelijk gebruik te maken van andersoortige aandrijfelementen, bijvoorbeeld hefboomsystemen of van profielnokschijven voorziene systemen.

25 Het zal uiteraard duidelijk zijn dat een aandrijvingsvorm moet worden gekozen welke past in de beperkte, beschikbare ruimte.

Verder is bij deze uitvoeringsvorm sprake van uitwerpelementen. De uitwerpelementen worden gevormd door 30 stempels 12 welke aan hun onderzijde van een pen 13 zijn voorzien, waarbij tussen de onderzijde van de pen 13 en de onderplaat 2 een veer 14 is aangebracht. Bij het naar boven bewegen van de plaat 2 om de segmenten 5 van de eerste positie naar de tweede, lossende positie te 35 brengen, zal de veer 14 worden ingedrukt, waarna het stempel 12 bij het bereiken van de lossende positie het product naar buiten zal drukken.

Deze laatste maatregel is echter niet specifiek noodzakelijk voor het toepassen van de onderhavige uitvinding, zij vormt slechts een aantrekkelijke extra maatregel.

5 In figuur 2 is getoond hoe de segmenten 5 zich in hun lossende positie bevinden; overgrijpende randen van het gevormde product vormen daarbij geen problemen, zodat een grotere vrijheid ontstaat bij het ontwerpen van door deze inrichting te vervaardigen producten.

10 Hierbij wordt opgemerkt, dat bij de onderhavige uitvoeringsvorm sprake is van het verdelen in vier segmenten. Het is uiteraard mogelijk gebruik te maken van andere aantallen segmenten. Om de aandrijving zo eenvoudig mogelijk te houden zal men streven naar een
15 klein aantal segmenten, dus bijvoorbeeld 2. Hiermee worden in veel gevallen echter niet voldoende vrijheid verkregen voor het losmaken van de gevormde producten. Vier blijkt een aantrekkelijk aantal segmenten te zijn.

Zoals in figuur 3 en 4 getoond is, is het ook
20 mogelijk gebruik te maken van een veel groter aantal segmenten. Hierbij wordt gebruik gemaakt van een zekere vorm van cirkelsymmetrie, zodat ondanks het grote aantal segmenten gebruik gemaakt kan worden van een simpele aandrijving. Zo toont figuur 3 een bovenplaat 4, waarin
25 een gat 7 is aangebracht, waaronder zich een holte 6 bevindt. De holte 6 wordt omgeven door twaalf segmenten 15 die aan hun buitenzijde conisch zijn. Zij worden omgeven door een ring 16, die aan zijn binnenzijde conisch is. De ring 16 is in verticale richting
30 beweegbaar waardoor de segmenten 15 naar elkaar toe worden bewogen tot de positie die in figuur 3 is weergegeven.

Wanneer daarna de ring 16 naar beneden wordt bewogen, zoals in figuur 4 is weergegeven, krijgen de
35 segmenten 16 de gelegenheid naar buiten te bewegen. De beweging naar buiten wordt bij de in Figuren 3 en 4 weergegeven uitvoeringsvorm bereikt doordat de segmenten aan hun binnenzijde ook van een conische rand zijn

voorzien, welke door een kegelvormig lichaam 17 naar
buiten wordt gedrongen wanneer dit kegelvormige lichaam
17 naar boven beweegt. Hierbij is het uiteraard vereist
bewegingen van het kegelvormige lichaam 17 en de ring 16
5 zijn gesynchroniseerd. Verder is het kegelvormige lichaam
17 aan zijn bovenzijde van een stempel 18 voorzien voor
het uitdrukken van het voltooide product 19.

Het zal duidelijk zijn dat ook bij een groot
aantal segmenten 15 andere constructies kunnen worden
10 toegepast, bijvoorbeeld een constructie waarbij elk van
de segmenten 15 door middel van een veer naar binnen of
naar buiten wordt gedrongen, en waarbij door een beweging
van een lichaam de betreffende dringkracht wordt
teggengewerkt.

15 Ook het aantal segmenten kan uiteraard sterk
worden veranderd.

Conclusies

1. Inrichting voor het door middel van een blaasproces van een laag materiaal dat bij verwarming vervormbaar is vormen van een aantal dunwandige voorwerpen, omvattende:

- 5 - een ondermatrijs met daarin aangebrachte holten, waarbij de vorm van elk van de holten overeenkomt met de buitenvorm van de te vormen voorwerpen;
- middelen voor het tot op de ondermatrijs brengen van de te vormen laag materiaal;
- 10 - toevoermiddelen voor het toevoeren van gas aan de bovenzijde van de ondermatrijs;
- verwarmingsmiddelen voor het verwarmen van de ondermatrijs; en

15 **met het kenmerk**, dat de ondermatrijs verdeeld is in aantal segmenten, waarbij rondom elke holte een aantal segmenten is geplaatst en de segmenten in hoofdzakelijk radiale richting beweegbaar zijn tussen een eerste positie waarin zij de wand vormen van de holte die door

20 de segmenten wordt omsloten en een tweede positie waarin een in de holte gevormd voorwerp tot buiten de vorm beweegbaar is.

2. Inrichting volgens conclusie 1, **met het kenmerk**, dat elke holte door tenminste drie segmenten

25 wordt omgeven, waarbij de scheidingsvlakken tussen de segmenten zich hoofdzakelijk loodrecht op het bovenvlak van de ondermatrijs uittrekken, en dat elk van de segmenten door een aandrijforgaan voor beweging tussen de eerste en de tweede positie aandrijfbaar is.

30 3. Inrichting volgens conclusie 2, **met het kenmerk**, dat elke holte door vier segmenten wordt omgeven, waarbij elk van de segmenten door een lineair aandrijforgaan aandrijfbaar is.

4. Inrichting volgens conclusie 3, **met het**

35 **kenmerk**, dat de vier segmenten, die in de tweede positie zich dichter in elkaars nabijheid bevinden dan in de

eerste positie met een gemeenschappelijk aandrijfelement zijn gekoppeld.

5. Inrichting volgens conclusie 4, met het kenmerk, dat het gemeenschappelijke aandrijfelement is ingericht voor het uitvoeren van een beweging in een richting loodrecht op de bewegingsrichting van de segmenten en dat het gemeenschappelijke aandrijfelement door middel van een de bewegingsrichting omzettende koppeling met de vier segmenten is verbonden.

10 6. Inrichting volgens conclusie 5, met het kenmerk, dat de koppeling vier, zich elk onder eenzelfde hoek met de bewegingsrichting van het aandrijfelement uitstreckende prismatische pennen omvat, en dat de segmenten elk een kanaal omvatten waarin de pennen passen
15 en waarvan de as overeenkomt met de as van de pennen.

7. Inrichting volgens conclusie 6, met het kenmerk, dat de lineaire aandrijfelementen zich in de verticale richting uitstrekken.

8. Inrichting volgens een van de voorafgaande conclusies, met het kenmerk, dat aansluitend op de segmenten tenminste één tot de ondermatrijs behorende plaat is aangebracht en dat de plaat van geleidingsmiddelen is voorzien voor het geleiden van de segmenten bij het uitvoeren van hun beweging tussen de
25 eerste positie en de tweede positie.

9. Inrichting volgens conclusie 7, met het kenmerk, dat in elk van de holten een stempel is aangebracht, dat in verticale richting beweegbaar is voor het uitwerpen van de gevormde voorwerpen.

30 10. Inrichting volgens conclusie 9, met het kenmerk, dat de stempels voor aandrijving gekoppeld zijn met de aandrijving voor de segmenten.

11. Inrichting volgens conclusie 1, met het kenmerk, dat el van de vormen door tenminste zes
35 segmenten wordt omringd, welke segmenten elk aan een om een horizontale as kantelbare, zich hoofdzakelijk in verticale richting uitstreckende hefboom zijn verbonden.

12. Inrichting volgens conclusie 11, met het kenmerk, dat rondom de hefbomen een in verticale richting beweegbare ring is aangebracht voor het naar de eerste positie dringen van de segmenten.

5 13. Inrichting volgens conclusie 12, met het kenmerk, dat de hefbomen met een veer zijn verbonden voor het naar de tweede positie dringen van de segmenten.

Uittreksel

De uitvinding betreft een inrichting voor het door middel van een blaasproces van een laag materiaal dat bij verwarming vervormbaar is vormen van een aantal dunwandige voorwerpen, omvattende:

- 5 - een ondermatrijs met daarin aangebrachte holten, waarbij de vorm van elk van de holten overeenkomt met de buitenvorm van de te vormen voorwerpen;
- middelen voor het tot op de ondermatrijs brengen van de te vormen laag materiaal;
- 10 - toevoermiddelen voor het toevoeren van gas aan de bovenzijde van de ondermatrijs;
- verwarmingsmiddelen voor het verwarmen van de ondermatrijs; en
- tot in de holten beweegbare doorns,
- 15 waarbij de ondermatrijs verdeeld is in aantal segmenten, waarbij rondom elke holte een aantal segmenten is geplaatst en de segmenten in hoofdzakelijk radiale richting beweegbaar zijn tussen een eerste positie waarin zij de wand vormen van de holte die door de segmenten
- 20 wordt omsloten en een tweede positie waarin een in de holte gevormd voorwerp tot buiten de vorm beweegbaar is.

1/3

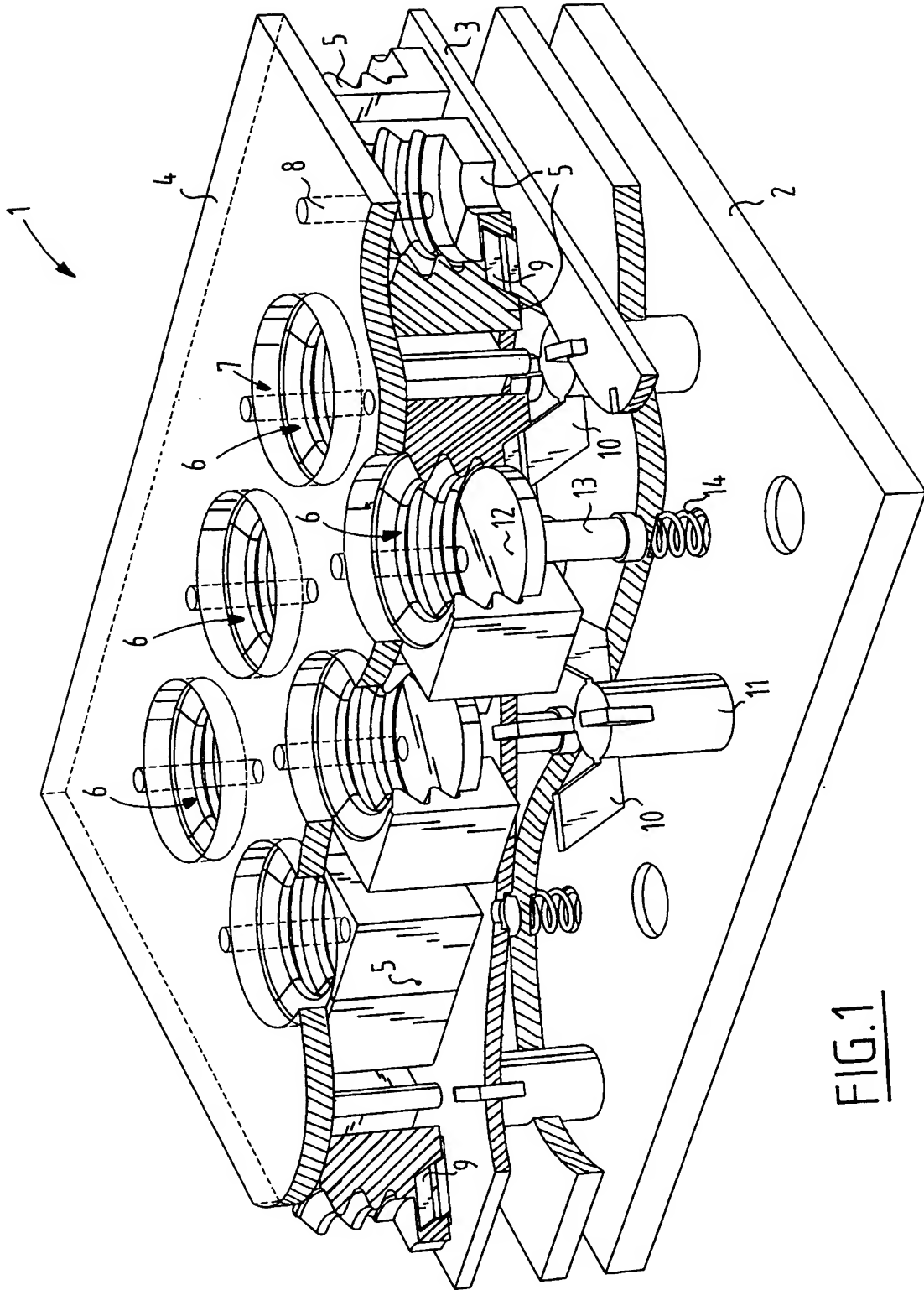
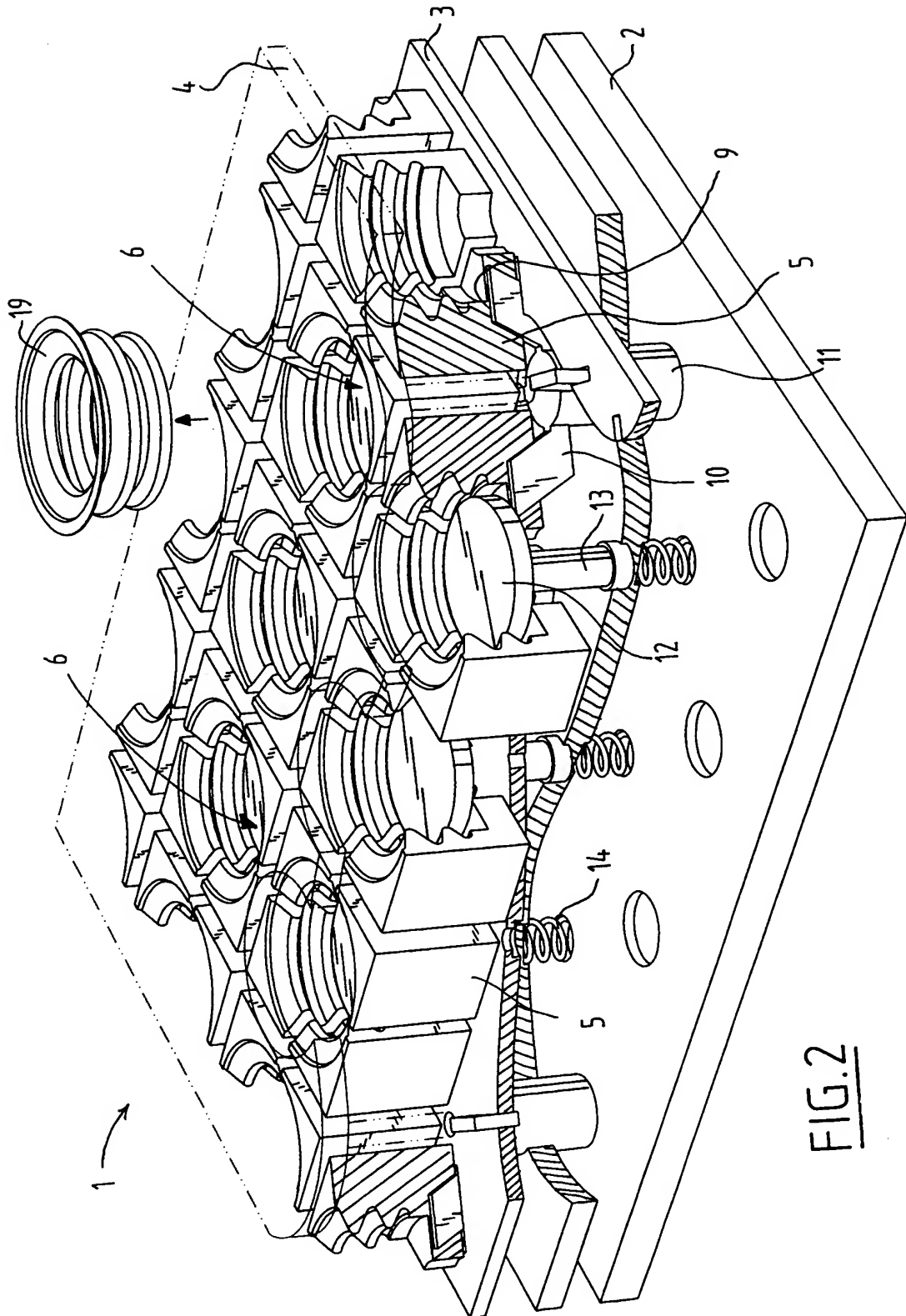


FIG.1

2/3



3/3

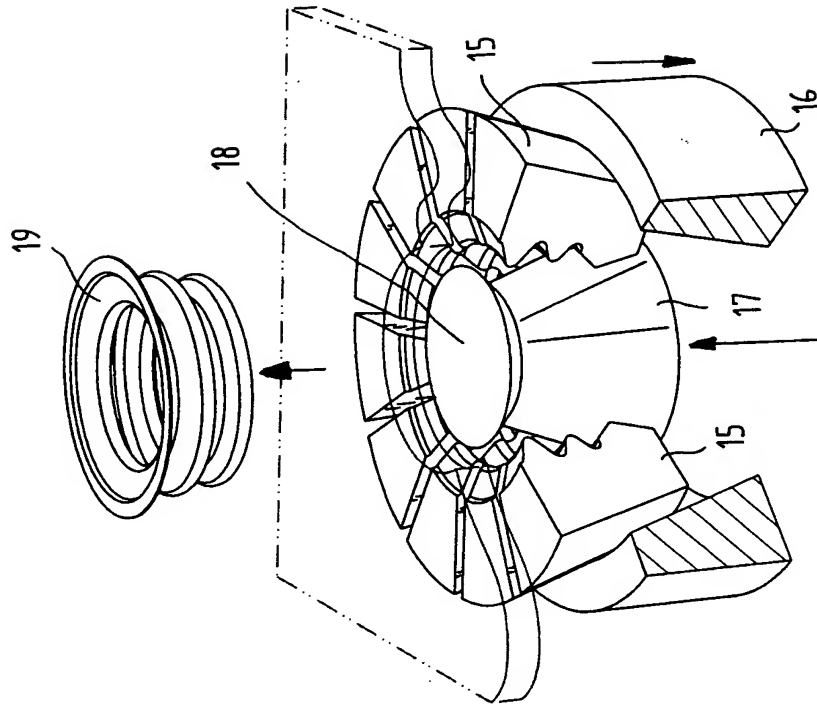


FIG. 4

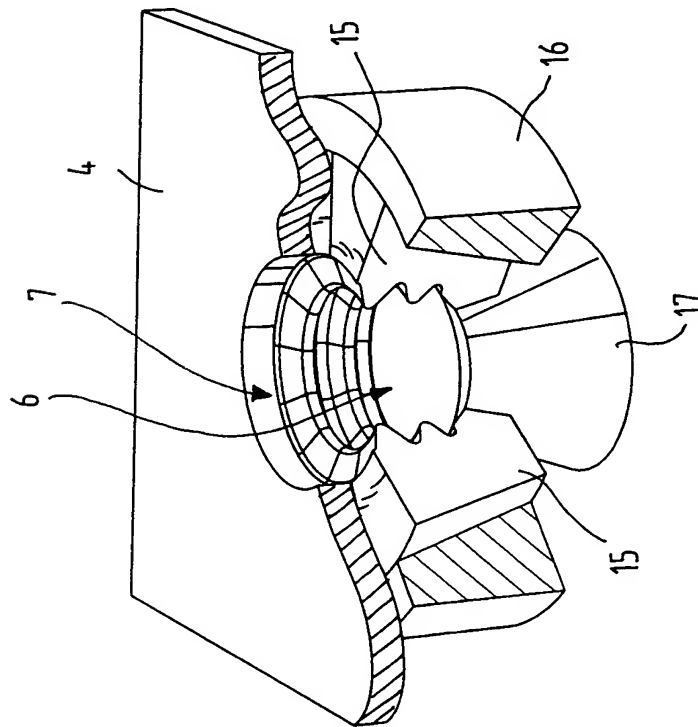


FIG. 3

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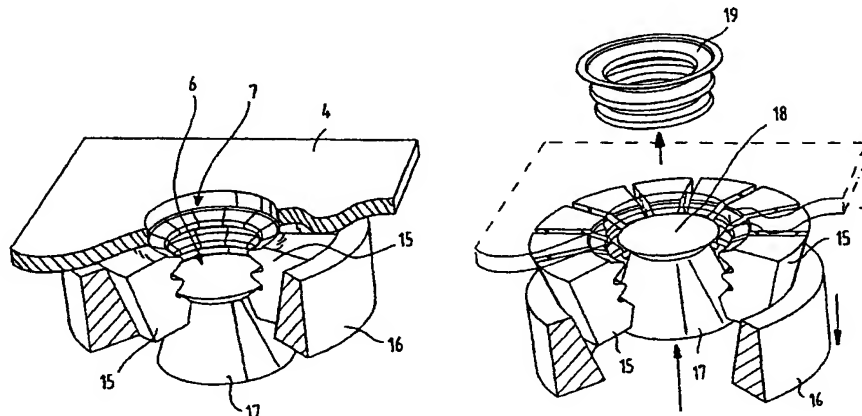
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(54) Title: **RELEASING UNDERCUT MOULDED CONTAINERS AFTER A THERMOFORMING PROCESS**



(57) Abstract: The invention relates to a device for forming a number of thin-walled objects by means of a blow-moulding process from a layer of material which is deformable when heated, comprising: a lower mould with cavities (6) arranged therein, wherein the shape of each of the cavities (6) corresponds with the external shape of the objects to be formed; means for carrying the layer of material to be moulded onto the lower mould; supply means for supplying gas to the upper side of the lower mould; heating means for heating the lower mould; and mandrels movable into the cavities, wherein the lower mould is divided into a number of segments (5), wherein a number of segments (5) is placed around each cavity and the segments are movable in substantially radial direction between a first position, in which they form the wall of the cavity enclosed by the segments (5), and a second position in which an object (19) formed in the cavity can be moved out of the mould.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

RELEASING UNDERCUT MOULDED CONTAINERS AFTER A THERMOFORMING PROCESS

The invention relates to a device for forming a number of thin-walled objects by means of a blow-moulding process from a layer of material which is deformable when heated, comprising:

- 5 - a lower mould with cavities arranged therein, wherein the shape of each of the cavities corresponds with the external shape of the objects to be formed;
- means for carrying the layer of material to be moulded onto the lower mould;
- 10 - supply means for supplying gas to the upper side of the lower mould;
- heating means for heating the lower mould;
- and
- mandrels movable into the cavities.

15 Such devices are generally known. They are used to form products such as containers for coffee milk, yoghurt, salads and numerous other products by a blow-moulding process. Used as a starting point here is a thin layer of material which is deformable when heated and
20 which is pushed fixedly into the cavity by means of compressed air, or pressurized air, is there cooled, whereby the shape is retained, and the completed product is then transported away.

25 The fact that product which is to a certain degree form-retaining must be removed from the mould imposes limitations in the prior art on the shape of the product.

30 There is however a need for more freedom in the choice of the shape of the product in order for instance to provide the product with additional functions.

 The present invention therefore has for its object to provide such a device which is suitable for manufacturing shapes which in the prior art cannot be released from the mould.

This objective is achieved in that the lower mould is divided into a number of segments, wherein a number of segments is placed around each cavity and the segments are movable in substantially radial direction
5 between a first position, in which they form the wall of the cavity enclosed by the segments, and a second position in which an object formed in the cavity can be moved out of the mould.

The mobility of the segments between a first
10 position, in which the moulding process takes place, and a second position, in which the rigid product can be removed from the mould, results in a greater freedom in choosing the shape of the products for finishing.

It is herein noted that it is indeed known in
15 injection mould production to use divisible moulds. Injection moulding is however a process wherein there is greater freedom and a much greater space is available for allowing movement of segments of the mould. In blow-moulding this is not the case; the blow-moulding process
20 limits the mobility of the mould to a great extent; as a result of the process, blow-moulded products are manufactured adjacently of each other, i.e. all with their upper surface in the same plane, wherein the movements of the mould, which in the process in question
25 is usually designated as lower mould, under the relevant plane are limited. It has therefore been assumed heretofore that it is impossible to provide a device for the blow-moulding process wherein the moulds are divisible for release of the finished product.

30 Certainly where small products are manufactured a blow mould will contain a relatively large number of cavities, so that the problem is made even more difficult.

According to another embodiment each cavity is
35 enclosed by at least three segments wherein the separating planes between the segments extend substantially perpendicularly of the upper surface of the lower mould, and each of the segments is drivable for

movement between the first and second position by a drive member.

Geometric considerations indicate the attraction of this embodiment; the distance between the first and the second position of the segments is limited, while sufficient freedom for release of the mould is still obtained.

According to an attractive embodiment each cavity is enclosed by four segments, wherein each of the segments is drivable by a linear drive member. The use of four segments results in a structure of paths extending perpendicularly of each other, which is structurally attractive.

When the four segments, which are situated in closer proximity to each other in the second position than in the first position, are coupled to a common drive element, there is a resulting simplification since the number of drive elements is reduced.

According to a particularly attractive embodiment the common drive element is adapted to execute a movement in a direction perpendicular to the direction of movement of the segments, and the common drive element is connected to the four segments by means of a coupling converting the direction of movement.

This configuration is particularly attractive structurally; a common drive element can be used to cause a movement in four different directions.

An even more attractive embodiment results when the coupling comprises four prismatic pins, each extending at the same angle relative to the direction of movement of the drive element, and the segments each comprise a channel into which the pins fit and the axis of which corresponds with the axis of the pins.

Provided this construction is manufactured with a sufficiently small tolerance, a structurally very simple configuration results.

Other attractive embodiments are specified in the remaining sub-claims.

The present invention will be elucidated hereinbelow with reference to the annexed figures, in which:

figure 1 is a partly broken-away perspective view of a first embodiment of a device according to the present invention in a first position of the segments;

Figure 2 is a view corresponding to Figure 1 wherein the segments are situated in the second position;

Figure 3 shows a partly broken-away perspective view of a second embodiment of a device according to the present invention; and

figure 4 shows a view corresponding to Figure 3 wherein the segments are situated in the second position.

Figure 1 shows a mould which is designated as a whole with 1. The lower mould is formed by a base plate 2, an intermediate plate 3 and a top plate 4. A large number of segments 5 is arranged between top plate 4 and intermediate plate 3. Segments 5 are herein grouped around cavity 6.

In the present embodiment five segments are arranged around each cavity 6. The cavities correspond with relevant holes 7 arranged in top plate 4. Intermediate plate 3 and top plate 4 are mutually connected by connecting elements 8. Connecting elements 8 are placed such that they do not obstruct the movements of segments 5.

Channels 9 are arranged in segments 5 in order to drive segments 5 between the first position shown in figure 1, in which the forming of the product can take place, and the position shown in figure 2 in which the product can be released from the moulds. Extending in the channels are pins 10, which are drawn in the present case with a rectangular cross-section but which may equally be embodied round, for instance with the shape of a circular cylinder. Essential here is that they fit precisely into channels 9.

The pins 10 are all connected to a cylinder 11. Each of the cylinders 11 is connected to base plate 2. By

moving base plate 2 up or downward, the segments are therefore moved between their first position, shown in Figure 1, and second position, shown in Figure 2.

It will be apparent that it is possible to
5 employ other forms of drive, for instance an individual drive element instead of each of the cylinders 11. It is also possible to make use of other types of drive element, for instance lever systems or of systems provided with profiled cam discs.

10 It will of course be apparent that a form of drive must be chosen which fits into the limited space available.

This embodiment also has ejector elements. The ejector elements are formed by stamps 12 which are
15 provided on their underside with a pin 13, wherein a spring 14 is arranged between the underside of pin 13 and base plate 2. When plate 2 is moved upward in order to carry segments 5 from the first position to the second, release position, spring 14 will be compressed,
20 whereafter stamp 12 will press out the product when the release position is reached.

This latter measure is however not specifically necessary for applying of the present invention, it merely forms an attractive additional measure.

25 Figure 2 shows how segments 5 are situated in their release position; protruding edges of the formed product do not represent problems here, thus resulting in a greater freedom in the design of products to be manufactured by this device.

30 It is noted herein that in the present embodiment there is a division into four segments. It is of course possible to make use of other numbers of segments. In order to keep the drive as simple as possible, the aim will be a small number of segments,
35 thus for instance two. In many cases, however, sufficient freedom is not obtained herewith for release of the formed products. Four is found to be an attractive number of segments.

As shown in figures 3 and 4, it is also possible to make use of a much larger number of segments. Use is made herein of a certain form of circle symmetry, so that despite the large number of segments use can be made of a simple drive. Figure 3 thus shows a top plate 4 in which a hole 7 is arranged, below which a cavity 6 is situated. Cavity 6 is enclosed by twelve segments 15 which are conical on their outside. These are enclosed by a ring 16 which is conical on its inner side. Ring 16 is movable in vertical direction, whereby segments 15 are moved toward each other into the position shown in figure 3.

When ring 16 is then moved downward as shown in figure 4, segments 16 are able to move outward. In the embodiment shown in Figures 3 and 4 the outward movement is achieved in that the segments are also provided on their inner side with a conical edge which is urged outward by a conical body 17 when this conical body 17 moves upward. It is of course a prerequisite here that the movements of conical body 17 and ring 16 are synchronized. Conical body 17 is further provided on its top with a stamp 18 for pressing out the finished product 19.

It will be apparent that other constructions can also be applied in the case of a large number of segments 15, for instance a construction wherein each of the segments 15 is urged inward or outward by means of a spring, and wherein the urging force in question is counteracted by a movement of a body.

The number of segments can of course also be greatly changed.

CLAIMS

1. Device for forming a number of thin-walled objects by means of a blow-moulding process from a layer of material which is deformable when heated, comprising:
- a lower mould with cavities arranged therein,
 - 5 wherein the shape of each of the cavities corresponds with the external shape of the objects to be formed;
 - means for carrying the layer of material to be moulded onto the lower mould;
 - supply means for supplying gas to the upper
 - 10 side of the lower mould;
 - heating means for heating the lower mould;
- and
- mandrels movable into the cavities,
- characterized in that the lower mould is divided into a
- 15 number of segments, wherein a number of segments is placed around each cavity and the segments are movable in substantially radial direction between a first position, in which they form the wall of the cavity enclosed by the segments, and a second position in which an object formed
- 20 in the cavity can be moved out of the mould.
2. Device as claimed in claim 1, characterized in that each cavity is enclosed by at least three segments wherein the separating planes between the segments extend substantially perpendicularly of the
- 25 upper surface of the lower mould, and that each of the segments is drivable for movement between the first and second position by a drive member.
3. Device as claimed in claim 2, characterized in that each cavity is enclosed by four segments, wherein
- 30 each of the segments is drivable by a linear drive member.
4. Device as claimed in claim 3, characterized in that the four segments, which are situated in closer proximity to each other in the second position than in

the first position, are coupled to a common drive element.

5. Device as claimed in claim 4, **characterized in that** the common drive element is adapted to execute a movement in a direction perpendicular to the direction of movement of the segments, and that the common drive element is connected to the four segments by means of a coupling converting the direction of movement.

6. Device as claimed in claim 5, **characterized in that** the coupling comprises four prismatic pins, each extending at the same angle relative to the direction of movement of the drive element, and that the segments each comprise a channel into which the pins fit and the axis of which corresponds with the axis of the pins.

7. Device as claimed in claim 6, **characterized in that** the linear drive elements extend in the vertical direction.

8. Device as claimed in any of the foregoing claims, **characterized in that** at least one plate forming part of the lower mould is arranged connecting onto the segments and that the plate is provided with guide means for guiding the segments when they execute their movement between the first position and the second position.

9. Device as claimed in claim 7, **characterized in that** in each of the cavities is arranged a stamp which is movable in vertical direction to eject the formed objects.

10. Device as claimed in claim 9, **characterized in that** the stamps are coupled for driving to the drive for the segments.

11. Device as claimed in claim 1, **characterized in that** each of the moulds is enclosed by at least six segments, which segments are each connected to a lever tiltable on a horizontal axis and extending in substantially vertical direction.

12. Device as claimed in claim 11, **characterized in that** a ring movable in vertical

direction is arranged around the levers for urging the segments to the first position.

13. Device as claimed in claim 12,
characterized in that the levers are connected to a
5 spring for urging the segments to the second position.

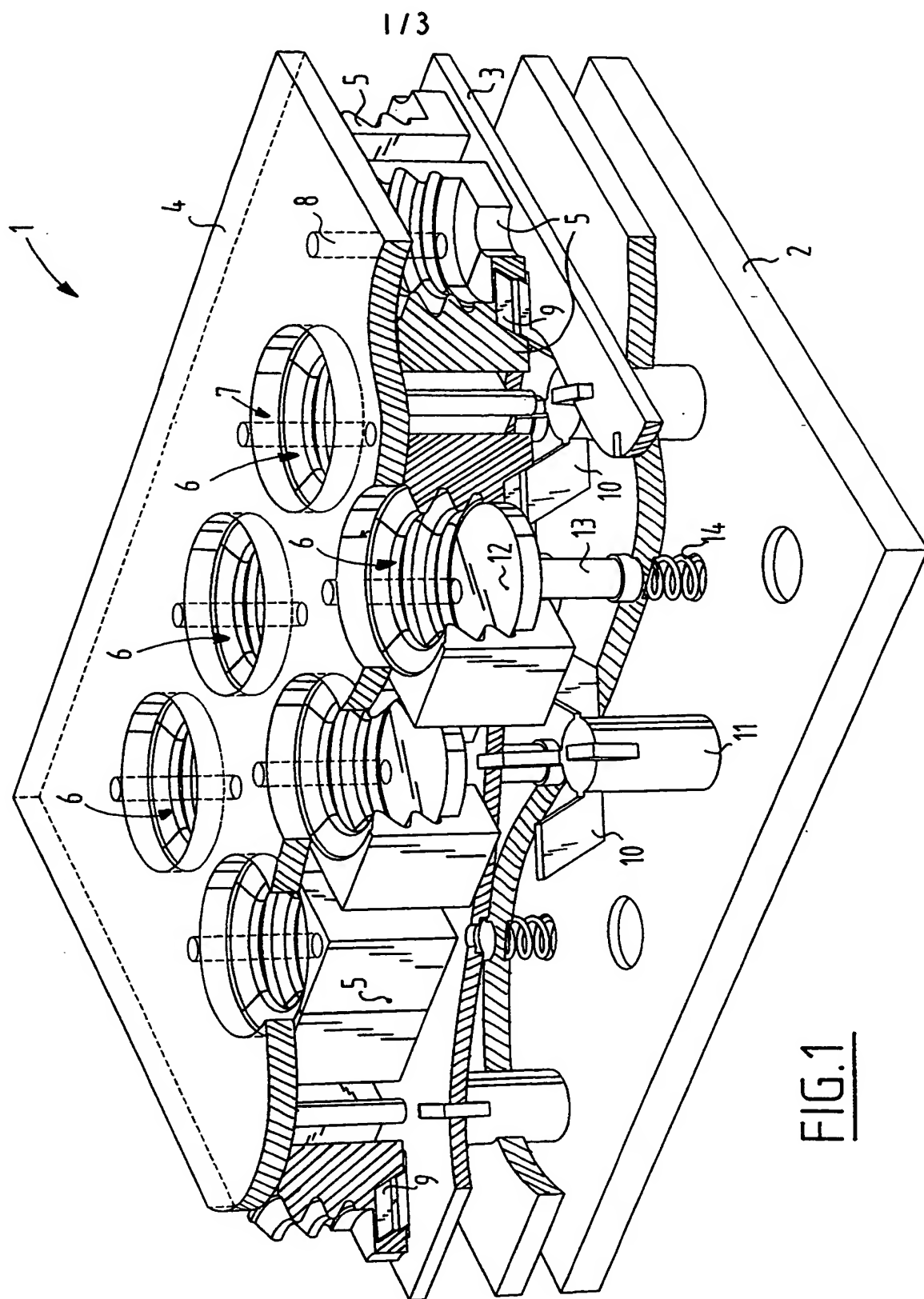
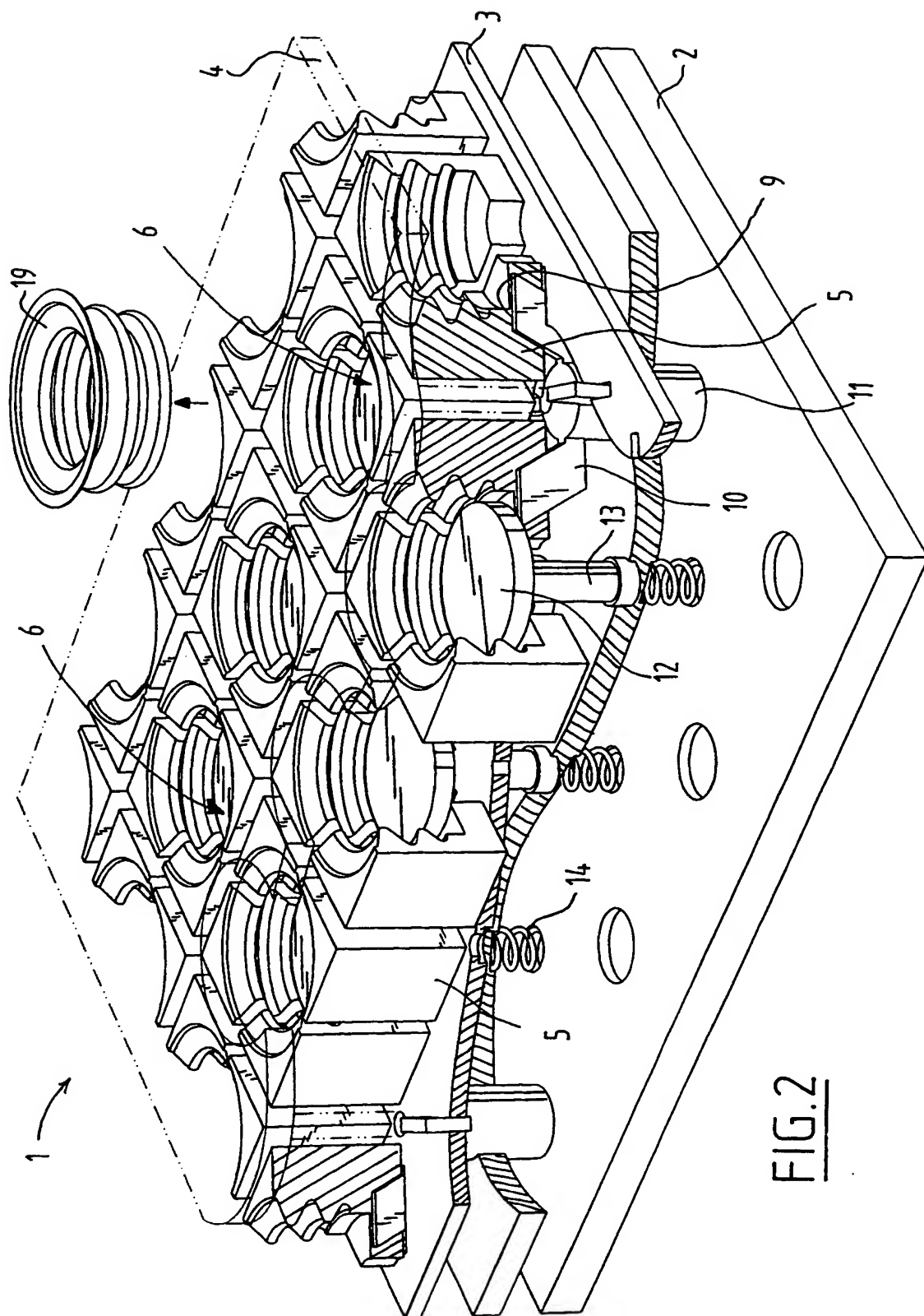


FIG.1

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3/3

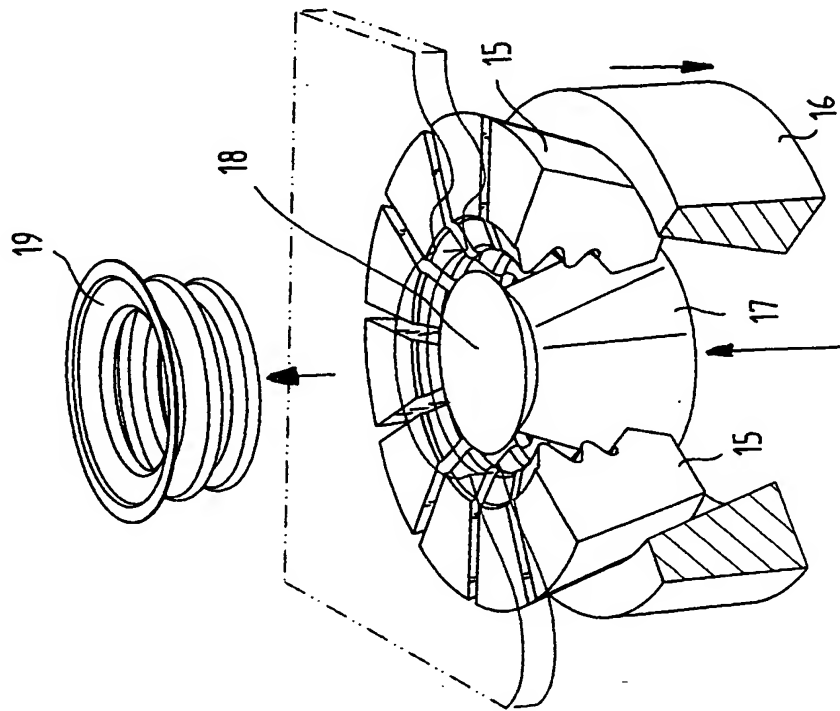


FIG. 4

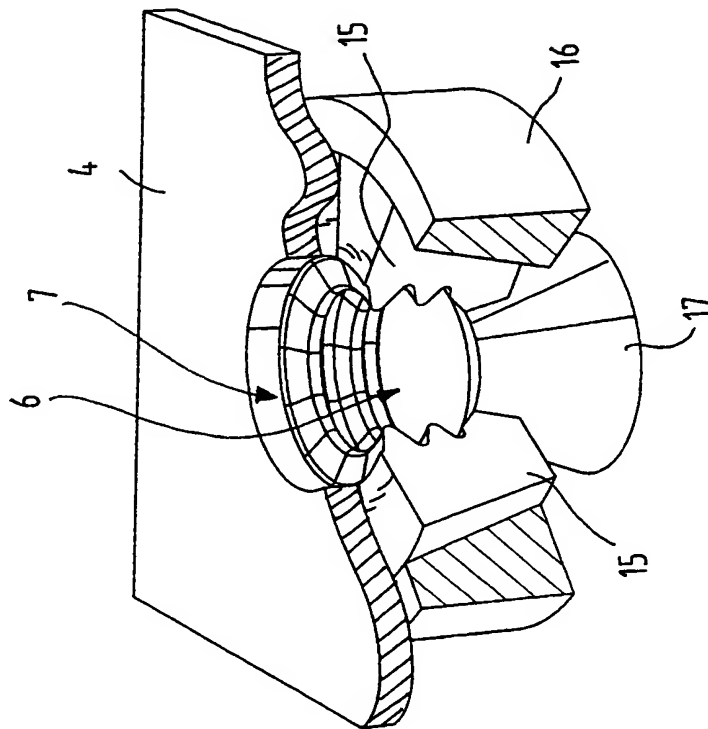


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00632

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B29C51/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 205 694 A (BROWN MACHINE COMPANY) 16 September 1970 (1970-09-16) page 2, line 77 -page 3, line 4; figures 4,5	1-5,8
X	DE 197 06 797 A (KOURTOGLOU SA) 27 August 1998 (1998-08-27) figures	1,8,9
X	US 3 259 942 A (C.J. POLITIS) 12 July 1966 (1966-07-12) figures	1
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

10 January 2001

Date of mailing of the international search report

19/01/2001

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00632

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>PATENT ABSTRACTS OF JAPAN vol. 1995, no. 02, - 31 March 1995 (1995-03-31) & JP 06 315977 A (TOYODA GOSEI CO LTD), 15 November 1994 (1994-11-15) abstract</p> <p>-----</p>	1

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